1. A composite structure comprising a structure made of at least one of a brittle ceramic and a brittle metalloid formed on a substrate surface, wherein the formed structure is polycrystalline and crystals forming the structure do not substantially exhibit crystal orientation, a boundary layer made of hyaline does not substantially exist on a boundary face between said crystals, and part of the formed structure is an anchor section biting into the substrate surface.

3. The composite structure according to claim 1, wherein the average crystallite size of the formed structure is 500 nm or less and the compactness thereof is 70% or more.

4. The composite structure according to claim 1, wherein the average crystallite size of the formed structure is 100 nm or less and the compactness thereof is 95% or more.

5. The composite structure according to claim 1, wherein the average crystallite size of the formed structure is 50 nm or less and the compactness thereof is 99% or more.

10. The composite structure according to claim 1, wherein the substrate is one of glass, metal, ceramics and an organic compound.

12. A composite structure forming method comprising, after performing a step of creating internal strain in brittle material fine particles, the steps of:

providing the brittle material fine particles in which the internal strain has been created on a substrate surface;

applying mechanical impact force to the brittle material fine particles;

deforming or fracturing the brittle material fine particles by the impact force;

rejoining fine particles through an active new surface generated by the deformation or fracture; and

forming an anchor section made of polycrystalline brittle material of which part bites into the substrate surface at a boundary section between the active new surface and a substrate, and

forming a structure made of the polycrystalline brittle material on the anchor section at the same time.

13. The composite structure forming method according to claim 11, wherein the step of creating the internal strain in the brittle material fine particles involves imparting an impact to the fine particles to such a degree that re-cohesion is not caused.

14. The composite structure forming method according to claim 11, wherein the internal strain created by the step of applying the internal strain is in a range between 0.25% and 2.0%.

15. The composite structure forming method according to claim 11, wherein the average size of the brittle material fine particles after the step of creating the internal strain has been performed is 0.1 ~ 5 μm and the speed of the brittle material fine particles upon collision with the substrate is 50 ~ 450 m/s.

16. The composite structure forming method according to claim 11, wherein the average size of the brittle material fine particles after the step of creating the internal strain has been performed is 0.1 ~ 5 μm and the speed of the brittle material fine particles upon collision with the substrate is 150 ~ 400 m/s.

17. The composite structure forming method according to claim 11, wherein this forming method is performed at room temperature.

18. The composite structure forming method according to claim 11, wherein, after the structure made of the polycrystalline brittle material is formed, the structure is heated at a

temperature lower than the melting point of the brittle material for structured control of the crystals.

19. The composite structure forming method according to claim 11, wherein this forming method is performed under reduced pressure.

20. The composite structure forming method according to claim 11, wherein the step of causing the brittle material fine particles to collide with the substrate surface at high speed involves ejecting an aerosol containing scattered brittle material fine particles in a gas toward the substrate at high speed.

21. The composite structure forming method according to claim 20, including a further step of controlling at least one of a type and a partial pressure of the gas to control a deficiency of elements of a compound forming the structure made of the brittle material.

23. The composite structure forming method according to claim 20, wherein the brittle material fine particles are formed of an oxide, and the method further includes a step of controlling a partial pressure of oxygen in the gas to form an oxygen deficient layer of the oxide near the boundary face of crystals in the structure made of the brittle material fine particles.

24. The composite structure forming method according to claim 20, including a further step of controlling at least one of a type and a partial pressure of the gas to control electric properties, mechanical properties, chemical properties, optical properties and magnetic properties of the structure made of the brittle material.

26. Brittle material fine particles for forming a structure on a substrate surface, wherein the particles deform or fracture upon collision with a substrate or when a

mechanical impact is imparted thereto, and the particles are provided with internal strain such that the particles generate an active new surface after being fractured or deformed.

44. A composite structure forming apparatus for ejecting and causing an aerosol generated by scattering brittle material fine particles in a gas to collide with a substrate at high speed to form a structure made of the brittle material, comprising: an aerosol generator for generating the aerosol, a nozzle for ejecting the aerosol and a classifier for classifying the brittle material fine particles in the aerosol.

45. A composite structure forming apparatus for ejecting and causing an aerosol generated by scattering brittle material fine particles in a gas to collide with a substrate at high speed to form a structure made of the brittle material, comprising: an aerosol generator for generating the aerosol, a nozzle for ejecting the aerosol, and a shredder for shredding cohesion of the brittle material fine particles in the aerosol, said shredder functions to achieve at least one of shredding the brittle material fine particles cohering in the aerosol and preventing cohesion of the brittle material fine particles in the aerosol.

46. A composite structure forming apparatus according to claim 45, further comprising a classifier for classifying the brittle material fine particles in the aerosol.

47. The composite structure forming apparatus according to claim 44, further comprising a pretreatment device for creating internal strain in the brittle material fine particles.

48. The composite structure forming apparatus according to claim 44, further comprising an impact imparting means for creating internal strain in the brittle material fine particles.

49. The composite structure forming apparatus according to claim 44, further comprising a position control means for controlling the position of the substrate relative to the nozzle.

50. The composite structure forming apparatus according to claim 49, wherein the position control means is a flexibly movable arm with the nozzle provided thereon.

51. The composite structure forming apparatus according to claim 44, wherein the aerosol generator comprises at least one of a container for containing the brittle material fine particles, a vibration device for imparting a mechanical vibration action to the container, and an electric field generating device for generating an electric field, wherein the container is provided with an introduction section for introducing the gas, and a guide section for guiding the aerosol outside.

54. The composite structure forming apparatus according to claim 45, wherein the shredder is provided with an introduction section and a guide section for introducing and guiding the aerosol respectively, and an impact plate with which the aerosol collides, wherein the aerosol is caused to collide with the impact plate at a lower speed than that for forming the structure of the brittle material fine particles to shred the ultra fine particles which are in a coarse cohering condition.

55. The composite structure forming apparatus according to claim 45, wherein the shredder is provided with a plurality of introduction sections, and aerosol streams ejected from these introduction sections collide with one another for shredding.

56. The composite structure forming apparatus according to claim 46, wherein the shredder applies at least one of ultrasonic waves and microwaves to the aerosol.

57. A composite structure formed according to the method of claim11.

58. A composite structure formed according to the method of claim12.

59. A composite structure formed according to the method of claim13.

60. A composite structure formed according to the method of claim14.

61. A composite structure formed according to the method of claim15.

62. A composite structure formed according to the method of claim16.

63. A composite structure formed according to the method of claim17.

64. A composite structure formed according to the method of claim18.

65. A composite structure formed according to the method of claim19.

66. A composite structure formed according to the method of claim 20.

67. A composite structure formed according to the method of claim 21.

68. A composite structure formed according to the method of claim 22.

69. A composite structure formed according to the method of claim 23.

70. A composite structure formed according to the method of claim 24.

71. A composite structure formed according to the method of claim 25.

72. The composite structure forming apparatus according to claim 45, further comprising a pretreatment device for creating internal strain in the brittle material fine particles.